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Forest Service
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Red Pine

An American Wood

Red pine is native to the Northeastern United States and adjacent areas in Canada. It is a long-lived species with some stands reaching 200 years of age. The American bald eagle often builds its nests in large old-growth red pine trees. The wood is easy to work with hand tools and holds nails and screws well. It is primarily used for structural purposes, but is also used for outdoor furniture and toys. Red pine is a popular Christmas tree.

Figure 1.—Red pine. F-529546

Red Pine
(Pinus resinosa Ait.)

Edwin Kallio and John W. Benzie[1]

Distribution

Red pine (*Pinus resinosa* Ait.) (fig. 1) is a native tree in the Lake States, New England, New York, Pennsylvania, and adjacent areas in Canada. It also grows locally in West Virginia and northern Illinois. The most extensive stands of red pine are in the northern Lake States and southern Ontario, where the tree is commonly found on level and gently rolling sand plains. Further east, red pine stands generally cover smaller areas and are found not only on outwash plains, but also on mountain slopes and hilltops. Although red pine occurs from sea level to more than 2,000 feet elevation, it is most common between 700 and 1,400 feet.

The commercial range of red pine is a relatively narrow area a few hundred miles wide along the United States and Canadian border from the Great Plains to the Atlantic Ocean (fig. 2). Extensive planting has extended the species' natural range somewhat to the south of this belt. Planted stands now comprise a major part of its entire range.

Red pine grows best on well-drained sandy loam to loam soils, but is most common on sandy soils. It is generally found on more fertile soils than jack pine, but less fertile ones than white pine. On the drier sites, red pine grows in pure stands or in mixtures with jack pine, aspen, paper birch, and scrub oaks. On the more moist sites, it is found with white pine, red maple, red oak, balsam fir, and white spruce.

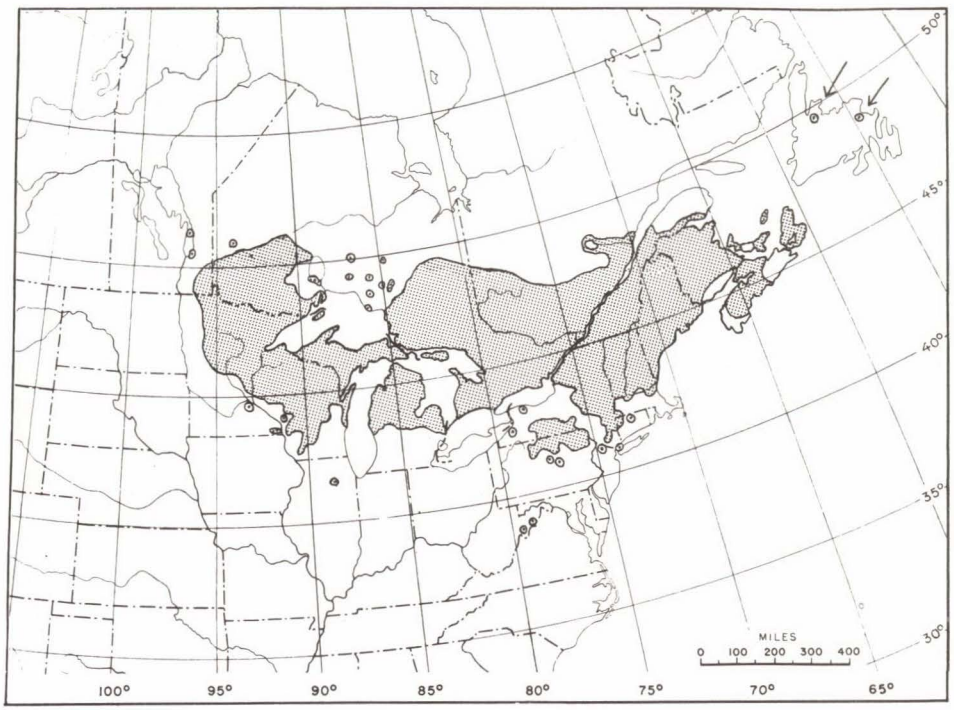

Figure 2.—Range of red pine. F-506628

Climatic conditions within the red pine range are generally cool-to-warm summers, cold winters, and low-to-moderate rainfall. Summer droughts are common, particularly in the western part of the range, and frost-free periods range from about 80 to 160 days.

Description and Growth

Red pine is a tall tree with a smooth, straight, clear bole of little taper and a symmetrically oval crown (fig. 1). Mature trees vary from about 50 to 80 feet in height and 1 to 3 feet in diameter at breast height (4.5 feet above the ground). The maximum reported size is 150 feet in height and 5 feet in diameter. The total yield per acre of 100-year-old, well-stocked, managed stands averages about 35,000 board feet or 9,000 cubic feet on poor sites and 50,000 board feet or 13,000 cubic feet on good sites. About two-thirds of the total yield is removed in periodic thinnings starting when the stand is approximately 30 years old (fig. 3).

Red pine has a tendency to form a taproot, but one is not always present. A wide-spreading root system is common. Most roots are near the soil surface, but a few are usually found at depths of 10 feet or more.

Needles of red pine are 4 to 6 inches long in fascicles of 2, or rarely 3, and remain attached to the branch for 3 or 4 years (fig. 4). The tree gets its name from the conspicuous reddish-brown color of its bark. In young trees, the bark is thin and flaky, but it soon develops into a thick layer of large, flat, superficially scaly plates (fig. 5).

Mature red pine cones are about 2 inches long. They are ovoid-conic in shape and chestnut-brown in color. Heavy seed crops occur infrequently at intervals of 10 to 12 years or more. Light to medium seed crops are produced every 3 to 7 years. Although seeds can germinate on the organic forest floor, few seedlings survive because the deep litter dries rapidly. Exposed mineral soil or prepared

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Figure 3.—Thinning in a red pine stand. F-529547

Figure 4.—Needles of red pine. F-529548

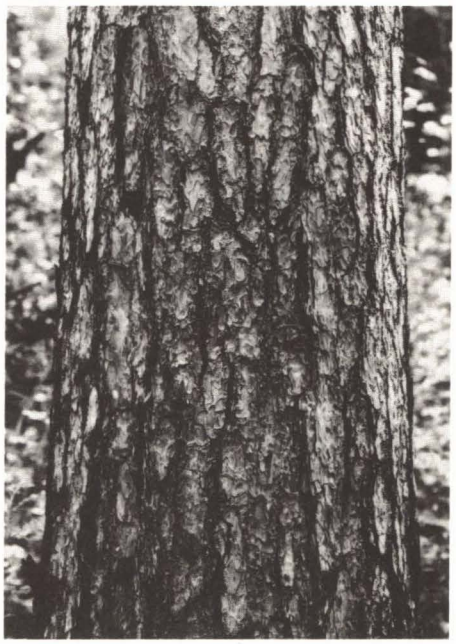

Figure 5.—Bark of red pine. F-243434

seedbeds increase the chances for success, but shrub competition may limit seedling survival and growth, especially on the better quality sites.

Seedlings usually grow slowly at first, requiring an average of 8 years to reach breast height. Thereafter, height growth ranges from about 1 to 2 or more feet per year, depending on the quality of the site. Red pine is intolerant of shade, so seedlings overtopped by shrubs or trees will grow much more slowly and, under moderate to dense competition, may not be able to survive. However, trees that have been overtopped for many years will still respond when the overstory is removed (released) with accelerated growth. Natural pruning in dense red pine stands is more effective than with most other conifers. Red pine is long-lived with some stands reaching 200 years of age or more, but commercial rotation ages for managed stands are generally between 60 and 120 years. After mature stands are harvested, new red pine stands are established and maintained by planting, release, thinning, and protection.

Red pine is generally believed to have fewer natural enemies than most other trees commonly associated with it. However, trees may be injured or killed by disease, insects, animals, fire, or weather. Scleroderris canker and red pine shoot blight are two diseases that have caused problems in young red pine. Other diseases include root rots, butt rots, and needle blights. Insects that may damage red pine include a number of sawflies, the red tussock moth, jack pine budworm, pine webworm, European pine shoot moth, Zimmerman pine moth, white pine weevil, Saratoga spittle bug, root collar weevil, white grubs, and bark beetles. Deer and rodents such as mice, hare, and porcupine sometimes injure red pine. Young red pine trees are susceptible to fire injury, but older trees have considerable resistance because of their

thick bark. Weather damage includes flooding, drought, ice and snow breakage, and lightning strikes.

In addition to their value for timber, red pine stands are favorite areas for many recreational pursuits. Wildlife values of red pine are generally considered low, but the American bald eagle often builds nests in large old-growth trees.

Common Names

Red pine is frequently called Norway pine. This term is probably related to the early marketing of the lumber by this name in Norway, Maine. From time to time, other local names have been used such as pig iron pine, pitch pine, and shellbark Norway, but these are not considered very common. Sometimes red pine is referred to as a hard pine or yellow pine to indicate that it is from that subgenus rather than the soft or white pine subgenus.

Related Commercial Species

White pine and jack pine are sometimes combined with red pine for resource information and production.

Supply

Red pine stands cover 1½ million acres in the Northeast and Lake States. Forest inventory data covering the 10-year period from 1966 to 1976 show that the growing stock volume of red pine—over 1 billion cubic feet—was about 4 percent of the total softwood volume.[2] Four billion board feet of the red pine volume was sawtimber.[3] Sawtimber volume has increased by about 1 billion board feet since earlier forest inventories reported during the period of 1946 to 1952. The annual growth of growing stock is 70 million cubic feet, which includes a quarter of a billion board feet of sawtimber. Most of the growing stock volume of red pine is in the Lake States. Minnesota has 26 percent of the total red pine volume, Michigan 19 percent, Wisconsin 18 percent, and New York 24 percent. Most of the remaining 13 percent of the volume is found in Maine, Pennsylvania, New Hampshire, and the southern New England States.

Production

Red pine sawtimber has traditionally been cut and sold in mixture with eastern white pine since the early days of the 16th century. An exception is the higher grades of white pine that are sawed exclusively for specialty lumber products. Production was centered in the Northeast until about 1840 when the logging industry moved to the Lake States. During the next 50 years, production of eastern white pine and red pine increased until it hit a peak of 9.4 billion board feet in 1889. As much as 30 percent of the total cut was estimated to be red pine. Production began to decline in the 1890's. Production statistics are reported together with white pine and jack pine in many States. Recent estimates of timber removals published in forest inventory reports between 1966 and 1976 show that about 12 million cubic feet of red pine is cut each year. About 40 million board feet of this volume is from sawtimber-size growing stock, and about 60 percent of the total cut of red pine now comes from the Lake States. The average annual cut of red pine sawtimber for the period from 1942 to 1951 was estimated at about 150 million board feet, or almost four times the cut in recent years.

Characteristics and Properties

The heartwood of red pine varies from red to reddish brown and is surrounded by sapwood that is nearly white to medium yellow and narrow to medium in width. Growth rings are distinct and delineated by a darker band of summer wood. The wood is somewhat oily, with a fairly strong resinous odor. The wood is usually straight and even-grained, medium-textured, and moderately heavy. A cubic foot of air-dry wood (12 percent moisture) weighs approximately 34 pounds. It is not as dense as a typical longleaf pine, but is denser than eastern white pine. As expected from a heavier wood, red pine is relatively strong and stiff and moderately high in shock resistance.

Red pine is moderately durable for ordinary purposes, unless it is untreated and in contact with the soil. However, sawn wood is easy to treat with preservatives. The wood has moderately large shrinkage (11.3 percent by volume from green to oven-dry), but is not difficult to dry. It is easy to work with hand tools, although not as easy as eastern white pine. Both species hold nails and screws well. Although red pine finishes well, its paint-holding quality is rated with the southern pines and Douglas-fir in the least satisfactory group of all softwoods.

Principal Uses

The relatively high strength value of red pine makes it a desirable wood for structural uses. Because the wood is straight, has little taper, and is easily treated with preservatives, it is used in roundwood form for poles, pilings, cabin logs, and posts. Red pine lumber is used for construction products such as girders, beams, joists, studs, stair parts, and trusses. Occasionally, the better grades of red pine lumber are used for house siding, framing, shelving, and trim millwork. It is also manufactured into products such as lawn and garden furniture, woodenware, novelties, and toys. Red pine is used with other softwoods in the manufacture of pulp to make paper.

[2]Net volume of all live merchantable sawtimber and poletimber trees from stump to a minimum 4.0-inch top diameter outside bark, on commercial forest land. Sawtimber trees are live trees at least 9.0 inches in diameter at breast height (d.b.h.) containing at least one merchantable saw log. Poletimber trees are live trees with good vigor and form, 5.0 to 8.9 inches d.b.h.

[3]Net volume of live merchantable sawtimber trees on commercial forest land. Minimum top diameter is 8.0 inches outside bark.

Red pine trees are used as windbreaks in the upper Midwest and Plains areas. The trees are often planted in parks and at roadsides for scenic effects. Red pine bark has been used occasionally for tanning leather, and old stumps have been used for the production of turpentine and resin. In addition, hundreds of thousands of plantation-grown and natural red pines are cut annually for Christmas trees.

References

Benzie, John W.
1977. Manager's handbook for red pine in the North Central States. U.S. Department of Agriculture, Forest Service, General Technical Report NC-33, 22 p. North Central Forest Experiment Station, St. Paul, Minn.

Buckman, Robert E.
1962. Growth and yield for red pine in Minnesota. U.S. Department of Agriculture, Technical Bulletin 1272, 50 p.

Chase, Clarence D., Ray E. Pfeifer, and John S. Spencer, Jr.
1970. The growing timber resource of Michigan, 1966. U.S. Department of Agriculture, Forest Service, Resource Bulletin NC-9, 62 p. North Central Forest Experiment Station, St. Paul, Minn.

Eyre, F. H., and Paul Zehngraff.
1948. Red pine management in Minnesota. U.S. Department of Agriculture, Circular 778, 70 p.

Ferguson, Roland H.
1968. The timber resources of Pennsylvania. U.S. Department of Agriculture, Forest Service, Resource Bulletin NE-8, 147 p. Northeastern Forest Experiment Station, Broomall, Pa.

Ferguson, Roland H., and Neal P. Kingsley.
1972. The timber resources of Maine. U.S. Department of Agriculture, Forest Service, Resource Bulletin NE-26, 129 p. Northeastern Forest Experiment Station, Broomall, Pa.

Ferguson, Roland H., and Carl E. Mayer.
1970. The timber resources of New York. U.S. Department of Agriculture, Forest Service, Resource Bulletin NE-20, 193 p. Northeastern Forest Experiment Station, Broomall, Pa.

Ferguson, Roland H., and Carl E. Mayer.
1974. The timber resources of New Jersey. U.S. Department of Agriculture, Forest Service, Resource Bulletin NE-34, 58 p. Northeastern Forest Experiment Station, Broomall, Pa.

Fowells, H. A. (compiler)
1965. Silvics of forest trees of the United States. U.S. Department of Agriculture, Agriculture Handbook 271, 762 p.

Gill, Thomas G., and Robert B. Phelps.
1969. Wood used in manufacturing industries, 1965. U.S. Department of Agriculture, Statistical Bulletin 440, 101 p.

Kingsley, Neal P.
1974. The timber resources of southern New England. U.S. Department of Agriculture, Forest Service, Resource Bulletin NE-36, 50 p. Northeastern Forest Experiment Station, Broomall, Pa.

Kingsley, Neal P.
1976. The timber resources of New Hampshire. U.S. Department of Agriculture, Forest Service, Resource Bulletin NE-43, 71 p. Northeastern Forest Experiment Station, Broomall, Pa.

Kingsley, Neal P., and Joseph E. Barnard.
1968. The timber resources of Vermont. U.S. Department of Agriculture, Forest Service, Resource Bulletin NE-12, 117 p. Northeastern Forest Experiment Station, Broomall, Pa.

Panshin, A. J., Carl de Zeeuw, and H. P. Brown
1964. Textbook of wood technology. Vol. 1. Structure, identification, uses, and properties of the commercial woods of the United States. 2nd ed. 643 p. McGraw-Hill, New York.

Spencer, John S., Jr., and Harry W. Thorne.
1972. Wisconsin's 1968 timber resource. U.S. Department of Agriculture, Forest Service, Resource Bulletin NC-15, 80 p. North Central Forest Experiment Station, St. Paul, Minn.

Stone, Robert N.
1966. A third look at Minnesota's timber. U.S. Department of Agriculture, Forest Service, Resource Bulletin NC-1, 64 p. North Central Forest Experiment Station, St. Paul, Minn.

U.S. Department of Agriculture, Forest Service, Forest Products Laboratory.
1974. Wood handbook. U.S. Department of Agriculture Handbook 72.

U.S. Department of Agriculture, Forest Service.
1965. Timber trends in the United States. U.S. Department of Agriculture, Forest Service, Forest Resource Report 17, 235 p.

U.S. Department of Agriculture, Forest Service.
1974. The outlook for timber in the United States. U.S. Department of Agriculture, Forest Service, Forest Resource Report 20, 374 p.

NOTE: This publication supersedes "Red Pine," U.S. Department of Agriculture, Forest Service, unnumbered American Woods leaflet, 1953.

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